DOCSIS 3.0 CMTS
Edge QAM

KATHREIN

Antennen · Electronic

- Fully DOCSIS 3.0 compatible
- Channel bonding of up to 16 channels (800 Mbps) in the forwards path and up to 16 channels (480 Mbps) in the return path
- Dynamic load balancing
- Downwards compatible with all DOCSIS/ EuroDOCSIS 1.0, 1.1 and 2.0 modems
- Separate modules for both the downstream and upstream
- Outstanding features proffered using original non-legacy anchored technology
- Optimally suited for IPTV operational scenarios using integrated Edge QAM and dynamic load balancing
- Highest module packing density available in the market
- Best multi-channel RF performance – exceeding DOCSIS DRFI specifications
- Extended frequency range – up to 1 GHz
- Wide range of operational features, e.g. “show cable modem”, flap list, spectral management and ready for deployment IP bonding
- Highest availability with hot plug and play, power redundancy and modules (C3200 and C10200)
- Three model platforms are offered enabling an optimal match to network size and subscriber volume
- Low power draw characteristics
- Front panel LEDs for status display
- Also available as Edge QAM unit (C2150)

Overview

With the DOCSIS 3.0 CMTS systems from Casa, Kathrein offers a new generation of CMTS units which set completely new levels of performance respective flexibility, operational features, packing density and economy.

A fundamental feature is thereby the full separation of the downstream and upstream channel modules in one physical chassis, allowing a flexible and ongoing system match-up to actual requirements based on a non-legacy and specifically designed chip technology.

This enables achievement of extremely high packing densities. One C3200 platform can, for example handle up to 80 downstream and 16 upstream channels or 48 downstream and 48 upstream channels in one single 19" module with only 3 rack units height.

The outstanding technology and highly integrated design also ensure a high operational economy. Low cost per channel and simple system extension with software upgrades offer high investment security and enable a comfortable step-by-step system build-up.

CASA

Modular and flexible architecture

All three CMTS platforms C2200, C3200 and C10200 are based on one single modular architecture enabling cable operators to customise their networks with maximal flexibility to their service requirements. All models utilise the same technology and the same software. Model differences are purely in the size, upgrading and redundancy possibilities – which are explained in the individual model feature lists.

Each platform offers a specific number of slots which can be occupied by any combination of downstream or upstream modules. Minimal operational occupancy would require at least one downstream and one upstream module.

Full DOCSIS 3.0 Features

The convincing technology base achieved in all three platforms has led to all being fully DOCSIS 3.0 qualified by CableLabs®. Thereby the CMTS platforms all fulfil more than the standard requirements of DOCSIS 3.0 – in part extensively.

The highest channel bonding capability of up to 16 channels (800 Mbps) in upstream and up to 16 channels (480 Mbps) in the downstream secure full future-proof features.
In this fashion any further advances in cable modem technology can be immediately utilised without having to change units or with new hardware. Further IPv6, AES coding and decoding and dynamic load balancing are supported.

Integrated Edge QAM function

The downstream channels can also be operated as MPEG or DVB-C conform MPEG-Video Edge QAMs, for example for digital Cable TV, Video-on-Demand, interactive TV and for network-based video recording (DVR). The unit then receives MPEG-2 over IP/Ethernet packets in multiple (MPTS) or in single programme transport streams (SPTS). The MPTS is then de-multiplexed, the native MPEG-2 packets being passed on to the QAM interfaces.

The re-multiplexing function creates multiple programme transport streams (MPTS) for the designated cable channels. The PSI/SI table processing, the PID filtering and substitution and PCR de-jittering is carried out in all model types.

Both CBR and VBR traffic are supported for narrowcast and broadcast applications. The C..200 series unit is the only product which can at one and the same time make the most efficient use of the RF bandwidth and maintain video quality concurrently using tools such as the statistical multiplexing of all MPEG video and DOCSIS traffic and the dynamical scheduling of MPEG and IP traffic.

Extensive Applications

For configuration and management the C..200 series unit proffers a Command Line Interface (CLI) and an SNMP. Operational functions such as “show cable modem”, “show ARP”, spectral management, CPU and memory resources reporting, user privilege management are all included in the latest product release.

Further extensive IP functions, such as DHCP relay and option 82, several DHCP servers, proxy ARP, IP sub-net bonding, IGMP snooping, IGMP v2 and v3, access control lists (ACL) are also included.

C2200/ C3200/ C10200

General Features and Function Overview

System
- MPEG switching from any port to any other port
- CLI and SNMP management

DOCSIS Features
- DOCSIS 3.0 Downstream channel bonding up to 16 channels (800 Mbps)
- DOCSIS 3.0 Upstream channel bonding up to 8 or 16 channels (240/480 Mbps)
- DOCSIS 3.0 AES coding
- IPv6
- DOCSIS 3.0 Multicast QoS
- Full DOCSIS/EuroDOCSIS 1.1 features
- DOCSIS/EuroDOCSIS 2.0 A-TDMA
- DOCSIS/EuroDOCSIS 2.0 S-CDMA (optional)
- Dynamic upstream and downstream load balancing
- Spectral management

IP Features
- DHCP Relay and Option 82
- Several DHCP servers
- Proxy ARP
- IP subnet bonding
- Statistical IP-routing
- IGMP snooping
- IGMP v2 and v3
- Several standard routes
- Access control list
- RIPv2
- OSPFv2

Processing of MPEG streams
- MPEG de-multiplexing and re-multiplexing
- Unicast to Multicast conversion
- PAT and PMT extraction and regeneration
- PID filtering and re-mapping
- PCR de-jittering and re-stamping
- Generation and insertion of SI tables
- DVB SimulCrypt scrambling
- Session based scrambling
- Programme insertion and integration

Management
- Serial interface RS 232 (DB9)
- Management port 10/100BaseT
- Command Line Interface (CLI)
- Telnet
- SNMPv1, v2 and v3
- Standard DOCSIS and IETF MIBs
- IPDR
- Casa Systems Enterprise MIBs
- Event logging over Syslog
- E-Mail reporting
- Resource use reporting

GbE interfaces
- 10/100/1000 Mbps
- Copper or fibre SFPs
- Global Line Rate Support

C2200 –
Compact and Powerful – for smaller and medium-sized networks

The C2200 CMTS can offer all the previously described advantages offered in Casa DOCSIS 3.0 units. Designed in an extremely compact 1 RU high 19" housing, the unit is especially suitable for smaller and medium sized nets. All the same it can offer, for example up to 48 downstream and 16 upstream channels. In the following the C2200 series features are listed.

Feature Highlights C2200

- 19" 1 RU carrier
- 4 module insert slots, arbitrary insertion of any wanted downstream and upstream modules
- Available downstream modules:
  - DQM 04: 4 channels, 1 chan. per port
  - DQM 08: 8 channels, 2 chan. per port
  - DQM 16: 16 channels, 4 chan. per port

Note: The number of downstream channels can at any time afterwards be raised per software upgrade in steps of 4 channels up to maximally 16 channels per module (licence model)

- Available upstream modules:
  - DCU 04: 4 channels, 1 chan. per port
  - DCU 08: 8 channels, 1 chan. per port
  - DCU 16: 16 channels, 2 chan. per port

  Note: the required model set-up with down and upstream modules is factory finished and delivered pre-configured. A hardware upgrade (extra or other module) must also be factory set.
- Integrated switch and management unit
  - Switch capacity: 12 x 2 Gbps
  - 4 Ethernet SFP ports 10/100/1000 Mbps
- Wide range power supply 90-264 V_{AC}

New: C2200 Low Capacity

Compact CMTS especially for low capacity requirements

- Completely pre-configured
- Available variants:
  - 1 downstream channel / 4 upstream channels
  - 2 downstream channels / 8 upstream channels
- Upgradable to 4 downstream channels with full DOCSIS 3.0 features through software
- Variant with 2 downstream / 8 upstream channels can be upgraded to 16 upstream channels through software
- All other features and equipment equivalent to C2200 platform

C2200
Special features and functions

System
- Switch capacity: 12 x 2 Gbps
- Four slots for DOCSIS modules per system
- 1-3 downstream modules per system
- 1-3 upstream modules per system

DOCSIS Features
- DOCSIS 3.0 Downstream channel bonding up to 16 channels (800 Mbps)

- DOCSIS 3.0 Upstream channel bonding up to 8 channels (240 Mbps)

GbE Interfaces
- 4-port copper or fibre SFP

Available CMTS Configurations:

		Upstream			Downstream		
Type	Order no.	No. modules	Chan-nels per module	Chan-nels total	No. modules	Chan-nels per module	Chan-nels total
C2200-1044-1014	26210488	1	4	4	1	1	1
C2200-1084-1024	26210489	1	8	8	1	2	2
C2200-1044-1044	26210200	1	4	4	1	4	4
C2200-1044-2044	26210201	1	4	4	2	4	8
C2200-1044-3044	26210202	1	4	4	3	4	12
C2200-2044-1044	26210203	2	4	8	1	4	4
C2200-2044-2044	26210204	2	4	8	2	4	8
C2200-3044-1044	26210205	3	4	12	1	4	4
C2200-1088-1084	26210408	1	8	8	1	8	8
C2200-1088-2084	26210233	1	8	8	2	8	16
C2200-1088-3084	26210234	1	8	8	3	8	24
C2200-2088-1084	26210235	2	8	16	1	8	8
C2200-2088-2084	26210236	2	8	16	2	8	16
C2200-3088-1084	26210237	3	8	24	1	8	8
C2200-1168-1164	26210238	1	16	16	1	16	16
C2200-1168-2164	26210239	1	16	16	2	16	32
C2200-1168-3164	26210240	1	16	16	3	16	48
C2200-2168-1164	26210241	2	16	32	1	16	16
C2200-2168-2164	26210242	2	16	32	2	16	32
C2200-3168-1164	26210243	3	16	48	1	16	16

Other configurations and p.s.u. with -48 V_{DC} on request.

C2200 Technical Data

Type		C2200-xxxx-xxxx	C2200-xxxx-xxxx
Order no.		**262102xx**	**262102xx**
Choice of operating system (downwards compatible)		DOCSIS 3.0	EuroDOCSIS 3.0
GbE interfaces (4 ports)			
Bit rates	Mbps	10/100/1000	10/100/1000
Interface modules		Copper or fibre SFP	Copper or fibre SFP
Timing Interface		T1	T1
Management port		10/100BaseT	10/100BaseT
Console port		1	1
Forward path (Downstream)			
Channel bonding, dependent upon equipment [1)]	Channels	2 ... 16	2 ... 16
Ports per module		4	4
RF port		F-type, 75 Ohm	F-type, 75 Ohm
Maximum bonded bandwidth	Mbps	800	800
Channel bandwidth	MHz	6	8
Frequency range	MHz	48 to 1002	48 to 1002
Modulation type		64 or 256 QAM	64 or 256 QAM
Modulation Error Rate (MER, equalised)	dB	44	44
Data rates		27 Mbps at 64 QAM; 38 Mbps at 256 QAM	36 Mbps at 64 QAM; 56 Mbps at 256 QAM
Output level	dBµV	121 for 1 channel/port; 117 for 2 channels/port; 113 for 4 channels/port	121 for 1 channel/port; 117 for 2 channels/port; 113 for 4 channels/port
Output impedance	Ohm	75	75
Return path (Upstream)			
Frequency range	MHz	5-42	5-65
Channel bandwidth	MHz	Variable 0.2-3.2	Variable 0.2-3.2
RF port		F-type, 75 Ohm	F-type, 75 Ohm
Data rate per channel	Mbps	0.32 ... 30.72	0.32 ... 30.72
Channel bonding, dependent upon equipment [1)]	Channels	2 ... 8	2 ... 8
Maximum bonded bandwidth	Mbps	240	240
Modulation type		QPSK, 16, 32 & 64 QAM	QPSK, 16, 32 & 64 QAM
Input level	dBµV	56 to 86	56 to 86
General			
Voltage supply	V AC	90 ... 264	90 ... 264
Power consumption (max.)	W	< 400	< 400
Ambient temperature range (operation)	°C	0 ... +50	0 ... +50
Relative humidity (operation)	%	5-95, non-condensing	5-95, non-condensing
Dimensions (W x H x D)	mm	483 x 45 x 597	483 x 45 x 597
Weight	kg	13.62	13.62
Security		UL/IEC/CSA 60950-1	UL/IEC/CSA 60950-1
EMC		FCC part 15 Class A and CISPR Class A	FCC part 15 Class A and CISPR Class A
		EN 61000-4, EN 55022, EN 55024	EN 61000-4, EN 55022, EN 55024

[1)] Due to the system with 1 DS channel, version C2200-1044-1014 does not support downstream channel bonding.

C3200

Universal and Flexible - for smaller, medium and larger networks

The C3200 CMTS also offers all beforehand described advantages covered by all Casa DOCSIS 3.0 units. Due to its distinct modular structure, the unit can be flexibly matched to the requirements of smaller, medium-sized and larger nets. Redundancy and hot-swapping of modules during operation ensure high operational security. In the 3 RU 19" housing one can handle up to 80 downstream and 16 upstream channels. In the following, the feature highlights of this CMTS model.

- 19" 3 RU housing
- 6 module slots - any of the downstream and upstream modules can be inserted in these
- High operational availability with hot plug and play modules
- Available downstream modules:
  - DQM 04: 4 channels, 1 chan. per port
  - DQM 08: 8 channels, 2 chan. per port
  - DQM 16: 16 channels, 4 chan. per port

  Note: the number of downstream channels can be raised later with software upgrades in 4 channel increments up to maximally 16 channels per module
- Available upstream modules:
  - DCU 04: 4 channels, 1 chan. per port
  - DCU 08: 8 channels, 1 chan. per port
  - DCU 16: 16 channels, 2 chan. per port

Note: the required unit configuration in down and upstream channels can be factory configured and delivered. Modules can also be ordered separately and retro-fitted or exchanged

- Switch and Management Module
  - Switch capacity: 24 x 2 Gbps
  - 12 Ethernet SFP ports 10/100/1000 Mbps

Note: the number of required SFP modules is dependent upon the desired data rate or on the required redundancy

- Hot pluggable fan tray
- Wide range power supply unit 90-264 V_{AC}, redundancy powering can be offered

Alternatively:

- Power supply unit -36…-60 VDC, redundancy powering can be offered

C3200 Special Features and Function Overview

Switch and Management System

- Switch capacity: 24 x 2 Gbps
- 1-5 Downstream modules per system
- 1-5 Upstream modules per system

DOCSIS Features

- DOCSIS 3.0 Downstream channel bonding up to 16 channels (800 Mbps)
- DOCSIS 3.0 Upstream channel bonding up to 16 channels (480 Mbps)

Module (SMM)

- 12-port GbE copper or fibre SFP

Available units and modules

C3200-Chassis_AC **26210147**
Base carrier unit for a switch and management module, 2 power supplies and 6 DOCSIS modules

C3200-AC_Power **26210150**
Wide-range power unit, 90-264 V_{AC}

C3200-DC-Power **26210473**
Power supply unit, -36…-60 V_{DC}

C3200-SMM-12GE **26210153**
Switch and Management module with 12 GbE SFP ports

C3200-DQM-04-4P **26210156**
4-chan./4-port DOCSIS downstream module
C3200-DQM-08-4P **26210159**
8-chan./4-port DOCSIS downstream module
C3200-DQM-12-4P **26210162**
12-chan./4-port DOCSIS downstream module
C3200-DQM-16-4P **26210165**
16-chan./4-port DOCSIS downstream module
C3200-DQM-4QUP **26210168**
4-chan. upgrade for 4/8/12-channel DOCSIS downstream modules

C3200-DCU-04S **26210171**
4-chan./4-port DOCSIS upstream module (S-CDMA and A-CDMA)

C3200-DCU-04A **26210177**
4-chan./4-port DOCSIS upstream module (A-CDMA)

C3200-DCU-08S **26210174**
8-chan./8-port DOCSIS upstream module (S-CDMA and A-CDMA)

C3200-DCU-08A **26210180**
8-chan./8-port DOCSIS upstream module (A-CDMA)
C3200-DCU-16A **26210196**
16-chan./8-port DOCSIS upstream module (A-CDMA)

CASA-SFP-CP **26210141**
GbE SFP 1000BaseT transceiver (copper, RJ 45)
CASA-SFP-LC **26210144**
GbE SFP 1000BaseSX transceiver (850 nm multi-mode, LC)

C3200 Technical Data

Type		C3200-xxxx-xxxx	C3200-xxxx-xxxx
Order no.		26210147	26210147
Operating system (downwards compatible)		DOCSIS 3.0	EuroDOCSIS 3.0
GbE interface switch and management module (12 ports)			
Bit rates	Mbps	10/100/1000	10/100/1000
Interface modules		Copper or fibre SFP	Copper or fibre SFP
Timing interface		T1	T1
Management port		10/100BaseT	10/100BaseT
Console port		1	1
Forward path (Downstream)			
Channel bonding, dependent upon device equipment	Channels	2 ... 16	2 ... 16
Ports per module		4	4
Maximum bonded bandwidth	Mbps	800	800
Channel bandwidth	MHz	6	8
Frequency range	MHz	48 to 1002	48 to 1002
Modulation type		64 or 256 QAM	64 or 256 QAM
Modulation Error Rate (MER, equalised)	dB	44	44
Data rates		27Mbps at 64 QAM; 38 Mbps at 256 QAM	36 Mbps at 64 QAM; 56 Mbps at 256 QAM
Output level	dBµV	121 for 1 channel/port; 117 for 2 channels/port; 113 for 4 channels/port	121 for 1 channel/port; 117 for 2 channels/port; 113 for 4 channels/port
Output impedance	Ω	75	75
Return path (Upstream)			
Frequency range	MHz	5-42	5-65
Channel bandwidth	MHz	Variable 0.2-3.2	Variable 0.2-3.2
Data rate per channel	Mbps	0.32 ... 30.72	0.32 ... 30.72
Channel bonding, dependent upon device equipment	Channels	2 ... 16	2 ... 16
Maximum bonded bandwidth	Mbps	480	480
Modulation type		QPSK, 16, 32 & 64 QAM	QPSK, 16, 32 & 64 QAM
Input level	dBµV	56 ... 86	56 ... 86
Connection		75 Ω, F-type	75 Ω, F-type
General			
Voltage supply	V_d	90 ... 264	90 ... 264
Power consumption fully equipped (max.)	W	< 700	< 700
Ambient temperature range (operation)	°C	0...+50	0...+50
Relative humidity (operation)	%	5-95, non-condensing	5-95, non-condensing
Dimensions (W x H x D)	mm	483 x 133 x 597	483 x 133 x 597
Weight fully equipped	kg	31.8	31.8
Security		UL/IEC/CSA 60950-1	UL/IEC/CSA 60950-1
EMC		FCC Part 15 Class A and CISPR Class A,	FCC Part 15 Class A and CISPR Class A,
		EN 61000-4, EN 55022, EN 55024	EN 61000-4, EN 55022, EN 55024

C10200
Carrier Class CMTS for highest requirements

The C10200 also offers all the many advantages covered by all Casa DOCSIS 3.0 systems as described above. Furthermore, this specific CMTS platform is specifically designed to cater for the highest demands of any network operator who requires the best possible service availability to be secured. All active functional units can be offered with full redundancy under hot plug and play conditions. Apart from the power supplies and fan trays, this also covers the switch and management unit and the down and upstream modules. The 12 RU 19" housing can be flexibly laid out with 12 down or upstream modules. That would allow a configuration of up to 704 downstream and 64 upstream channels. If symmetrically configured, then up to 384 downstream and 384 upstream channels could be enabled.

The C10200 can be configured with two different module series.
The "Revision 1" hardware is a particularly suitable option for small and medium-sized nets which aim to make full use of all the benefits offered by a Carrier Class CMTS. All essential active components can be operated redundantly, achieving maximum reliability.

The appeal of the"Revision 2" hardware lies in its considerably higher packing density and larger switch capacity. 10 GbE interfaces ensure the highest possible data throughput. This variant is the most cost-effective solution for medium-sized and large nets with full or partial redundancy.

In the following the special features of this system are listed.

- 19" housing, 12 RU
- 12 module slots, in which any of the downstream and upstream modules can be inserted
- Extensive redundancy possible for:
  - PSU unit (in delivery scope)
  - Fan tray (in delivery scope)
  - Switch and management module, (optional, 1+1 redundancy)
  - Down and upstream modules (optional, n+1 redundancy)
  - Network ports (total of 12 ports on switch and management module, in delivery scope)
- Exchangeable fan tray units
- Dual PSU -48 V_{DC}, redundancy operation
- Matching rectifier for 230 V_{AC} operation, optionally available:
  - Rect-Shelf: Carrier for up to four rectifier modules; Design 19", 1 RU
  - Rectifier: Rectifier module.

Note: To operate a C10200 platform, two rectifier modules are required.

Model Revision 1

- Available downstream modules:
  - DQM 16: 16 channels, 4 chan. per port
  - DS-IO 04: Interface card for downstream module

Note: For each DQM 16 one DS-IO 04 is required.

- Available upstream modules:
  - DCU 16: 16 channels, 1 chan. per port
  - DCU 32: 32 channels, 2 chan. per port
  - US-IO 16: Interface card for upstream modules

Note: For each DCU 16/32 one US-IO 16 is required.

- Available module for redundancy operation
  - RF-RD: Module for n+1 redundancy in down and upstream, 1+1 redundancy of Switch and Management Module including RF switch and redundancy software

  Note: If the RF-RD module is operated, then a DQM 16 or resp. a DCU 16/32 or resp. SMM-12GE should be foreseen as a redundancy module for each unit.

Note: The required system down and upstream configuration can be factory installed and delivered pre-configured. Modules can also be ordered individually and hot plug and play installed or exchanged during operation.

- High operational availability with hot plug-and-play exchangeable modules
- Switch and Management Module
  - Switch capacity: 48 x 2 Gbps
  - 12 Ethernet SFP ports 10/100/1000 Mbps
  - 1+1 redundancy possible using a second module

Note: The number of required SFP modules is determined by the desired data rate and redundancy requirements

Model Revision 2

- Available downstream modules:
  - DQM 32: 32 channels, 4 chan. per port
  - DQM 64: 64 channels, 8 chan. per port
  - DS-IO08: Interface card for downstream modules

  Note: For each DQM 32/64 one DS-IO08 is required.

- Available upstream modules:
  - DCU 32: 32 channels, 2 chan. per port
  - DCU 64: 64 channels, 4 chan. per port
  - US-IO16: Interface card for upstream modules

    For each DCU 32/64 one US-IO16 is required.

- Available module for redundancy operation
  - RF-RD: Module for n+1 redundancy in down and upstream, 1+1 redundancy of Switch and Management module including RF switch and redundancy software

Note: If the RF-RD module is operated, then a DQM 32/64 or resp. a DCU 32/64 or resp. SMM-10xGE should be foreseen as a redundancy module for each unit.

Note: The required system down and upstream configuration can be factory installed and delivered pre-configured. Modules can also be ordered individually and hot plug and play installed or exchanged during operation.

- High operational availability with hot plug-and-play exchangeable modules

- Switch and Management Module
  - Switch capacity: 24 x 20 Gbps
  - 2 Ethernet 10 GbE SFP+ Ports
  - 8 Ethernet SFP ports 10/100/1000 Mbps
  - 1+1 redundancy possible using a second module

Note: The number of required SFP modules is determined by the desired data rate and redundancy requirements

C10200
Special Features and Function Overview

Switch and Management System
- Switch capacity: 48 x 2 Gbps
- Two Switch and Management slots
- Twelve slots for DOCSIS modules per system:
- 1-11 Downstream modules per system
- 1-11 Upstream modules per system
- 12-port GbE copper or fibre SFP

DOCSIS Features
- DOCSIS 3.0 Downstream channel bonding up to 16 channels (800 Mbps)
- DOCSIS 3.0 upstream channel bonding up to 16 channels (480 Mbps)

IP Features
- L2 VPN VLAN tagging

Available units and modules

C10200-chassis-DC **26210418**
Base carrier unit for two switch and management modules, one redundancy module and 12 DOCSIS modules, incl. 2 PSUs and 3 fan tray units

C10200-RF-RD **26210425**
RF redundancy module for n+1 redundancy

CASA-SFP-CP **26210141**
GbE SFP 1000BaseT transceiver (copper, RJ 45)

CASA-SFP-LC **26210144**
GbE SFP 1000BaseSX transceiver (850 nm multimode, LC)

CASA-Rect-Shelf **26210478**
Module carrier for 4 rectifier modules, 19", 1 RU

CASA-Rectifier **26210479**
Rectifier module, 230 VAC/-48 V_{DC}

Model Revision 1

C10200-SMM-12GE **26210419**
Switch and Management module with 12 GbE SFP ports

C10200-DQM 16 **26210420**
16-channel/4-port DOCSIS downstream module

C10200-DCU-16A **26210422**
16-channel/16-port DOCSIS upstream module (A-CDMA)

C10200-DCU-16S **26210421**
16-channel/16-port DOCSIS upstream module (S-CDMA and A-CDMA)

C10200-DCU-32A-R1 **26210428**
32-channel/16-port DOCSIS upstream module (A-CDMA)

C10200-DS IO04 **26210429**
4-port downstream interface card

C10200-US IO16 **26210424**
16-port upstream interface card

Model Revision 2

C10200-SMM-10xGE **26210474**
Switch and Management module with 2x 10 GbE SFP+ ports und 8x GbE SFP Ports

C10200-DQM 32 **326210475**
32-channel/ 8-port DOCSIS downstream module

C10200-DQM 64 **26210476**
64-channel/ 8-port DOCSIS downstream module

C10200-DCU-32A-R2 **26210480**
32-channel/ 16-port DOCSIS upstream module (A-CDMA)

C10200-DCU64A **26210477**
64-channel/ 16-port DOCSIS upstream module (A-CDMA)

C10200-DS IO08 **26210423**
8-port downstream interface card

C10200-US IO16 **26210424**
16-port upstream interface card

C10200 Technical Data

Type		C10200-xxxx-xxxx	C10200-xxxx-xxxx
Order no.		26210xxx	26210xxx
Operating system type (downwards compatible)		DOCSIS 3.0	EuroDOCSIS 3.0
GbE interfaces Switch and Management module (10 or 12 ports)			
Bit rates	Mbps	10/100/1000	10/100/1000
Interface modules		Copper or fibre SFP	Copper or fibre SFP
Timing interface		T1	T1
Management port		10/100BaseT	10/100BaseT
Console port		1	1
Forward path (Downstream)			
Channel bonding	Channels	2 ... 16	2 ... 16
Ports per module		4	4
Maximum bonded bandwidth	Mbps	800	800
Channel bandwidth	MHz	6	8
Frequency range	MHz	48 to 1002	48 to 1002
Modulation type		64, 128 or 256 QAM	64, 128 or 256 QAM
Modulation Error Rate (MER, equalised)	dB	44	44
Data rates		27 Mbps at 64 QAM; 38 Mbps at 256 QAM	36 Mbps at 64 QAM; 56 Mbps at 256 QAM
Output level	dBµV	121 for 1 channel/port; 117 for 2 channels/port; 113 for 4 channels/port 110 for 8 channels/port	121 for 1 channel/port; 117 for 2 channels/port; 113 for 4 channels/port 110 for 8 channels/port
Output impedance	Ω	75	75
Return path (Upstream)			
Frequency range	MHz	5-42	5-65
Channel bandwidth	MHz	Variable 0.2-3.2	Variable 0.2-3.2
Data rate per channel	Mbps	0.32 ... 30.72	0.32 ... 30.72
Channel bonding	Channels	2 ... 16	2 ... 16
Maximum bonded bandwidth	Mbps	480	480
Modulation type		QPSK, 16, 32 & 64 QAM	QPSK, 16, 32 & 64 QAM
Input level	dBµV	56 ... 86	56 ... 86
Connection		75 Ω, F-type	75 Ω, F-type
General			
Voltage supply (double)	V_{DC}	-36 ... -60	-36 ... -60
Power consumption fully equipped Revision 1 (max.)	W	< 1600	< 1600
Power consumption fully equipped Revision 2 (max.)	W	< 2700	< 2700
Ambient temperature range (operation)	°C	0 ... +50	0 ... +50
Relative humidity (operation)	%	5-95, non-condensing	5-95, non-condensing
Dimensions (W x H x D)	mm	483 x 533 x 406	483 x 533 x 406
Weight fully equipped	kg	54.5	54.5
Security		UL/IEC/CSA 60950-1	UL/IEC/CSA 60950-1
EMC		FCC Part 15 Class A and CISPR Class A,	FCC Part 15 Class A and CISPR Class A,
		EN 61000-4, EN 55022, EN 55024	EN 61000-4, EN 55022, EN 55024

C2150 –
Separate Edge QAM

For pure QAM operations the C2150 is especially suitable as a flexible and compact solution. The revolutionary IF-bandwidth capacity of the C2150 and the cost per IP-stream open broad possibilities on how to economically offer high bandwidth IP services, such as Video-over-IP and interactive games. With the integrated MPEG video processing capability services such as MPEG or DVB-based switched digital video, Video-on-Demand (VOD) and interactive TV can be offered on the same platform.

- 1 RU 19" carrier
- High packing density
- Exceptional RF performance – fulfils the DOCSIS-DRFI RF specification for multi-channel QAMs
- Broadcast and Narrowcast support (MPTS-through or SPTS to MPTS mux) in the same RF channel
- MPEG processing – integrated Video Grooming, PID filtering and PCR reconditioning
- Conditional Access Scrambling - Integrated 3DES scrambling and DVB Common Scrambling (optional)

Operational possibilities:

1. MPEG Edge QAM and Video Switch
   - Video (MPEG) transport over QAM
   - Full compatibility to existing Edge QAM systems
2. MPEG Edge QAM and Video over DOCSIS (IP)
   - Common use of RF channels
3. Video over Docsis (IP)
   - Operation as DOCSIS downstream

C2150 - Features and Function Overview

System
Switch capacity: 24 Gbps
Ethernet switching and IP routing
MPEG switching from any port to any other port
CLI, SNMP and Web-GUI management
1~4 downstream modules per system, built-in

Standards
Compatible with EuroDOCSIS 1.0, 2.0, 3.0
Spanning Tree
SNMPvl, SNMPv3
IGMFV3
DHCP Relay
Proxy ARP

Processing of MPEG streams
MPEG re-multiplexing
Unicast-to-Multicast conversion
PAT and PMT extraction and regeneration
PID filtering and re-mapping

PCR de-jitterung and restamping
Generation and insertion of SI tables
DVB SimulCrypt scrambling
Session-based scrambling

Management
Serial interface RS 232 (DB9)
Management port 10/100BaseT
Command Line Interface (CLI)
Web-based user interface
Telnet
SNMP
Standard DOCSIS and IETF MIBs
Casa Systems Enterprise MIBs
Event logging over Syslog
Power monitoring
DVB Simul Crypt protocol

GbE interfaces
4 port copper or fibre SFP
CWDM
Extensive Line Rate support

Available units and modules

C2150 -1QAM16CH **26210184**
Edge QAM with 4 ports/16 channels, 230 V_{AC}

C2150 -2QAM32CH **26210187**
Edge QAM with 8 ports/32 channels, 230 V_{AC}

C2150 -3QAM48CH **26210190**
Edge QAM with 12 ports/48 channels, 230 V_{AC}

CASA-SFP-CP **26210141**
GbE SFP 1000BaseT transceiver (Copper, RJ 45)

CASA-SFP-LC **26210144**
GbE SFP 1000BaseSX transceiver (850 nm multi-mode, LC)

Models with -48 V_{DC} powering on request.

C2150 Technical Data

Type		C2150-xxx
Order no.		**262101xx**
GbE interface modules (4 ports)		Copper or fibre SFP
Bit rates	Mbps	10/100/1000
Management port		10/100BaseT
Console port		1
Forward path (Downstream)		
No. of modules		1/2/3/4 [1)]
Ports/channels per module		4/16
Channel bandwidth	MHz	6 … 8
Frequency range	MHz	48 … 1002
Modulation type		64,128 or 256 QAM
Modulation Error Rate (MER, equalised)	dB	43
Data rates		36 Mbps at 64 QAM; 56 Mbps at 256 QAM
Output level	dBµV	113 for 4 ch/port
General		
Voltage supply	V_{AC}	100 ... 240
Power consumption (max.)	W	< 400 W
Ambient temperature range (operation)	°C	0 ... +50
Dimensions (W x H x D)	mm	483 x 45 x 597
Weight	kg	13.62
Security		UL/IEC/CSA 60950-1
EMC		FCC Part 15 Class A and CISPR Class A, EN 61000-4, EN 55022, EN 55024

[1)] 4 modules on request with -48 V_{DC} power supply unit

DOCSIS/EuroDOCSIS 3.0 Cable modems

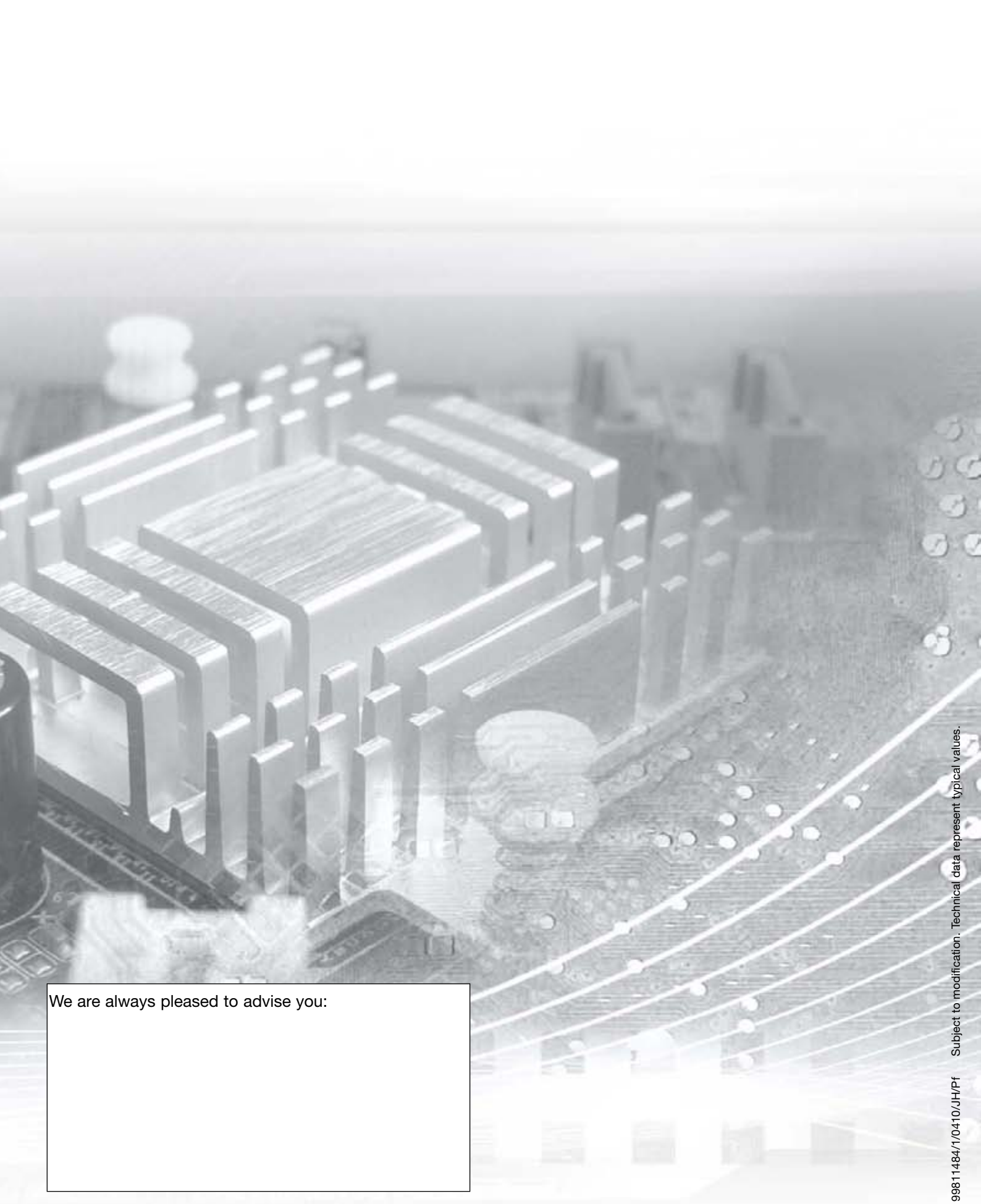
Kathrein offers a range of DOCSIS/ EuroDOCSIS 3.0-compliant cable modems which interact perfectly with the CMTS units described before. All Kathrein cable modems automatically identify if the protocol is DOCSIS or EuroDOCSIS, allowing easy commissioning without requiring manual intervention.
Their attractive, ultra-compact design and wide scope of delivery ensure smooth operation and a high level of customer acceptance.

The DCM 300, for example, offers ultra-high data rates, comprehensive SNMP management support, automatic switch-over to DOCSIS or EuroDOCSIS and is downwards compatible to a large extent to earlier DOCSIS standards. It is used for pure data operations.

The DCV 300 not only offers the same benefits, but is also additionally equipped with a built-in Multimedia Terminal Adapter (MTA). The unit features two telephony interfaces which support either SIP or MGCP.

Furthermore, Kathrein provides various special modem applications. Thanks to IPTV set-top boxes with integrated cable modems, complete IPTV system solutions can be created for cable operators. Cable modems mounted on installation rails support "smart metering" concepts. Using an integrated "M-Bus", data from electricity, gas, water meters, etc. can be read out and transferred. Kathrein would be happy to advise you on these applications.

You will find more details and the latest information on our cable modem range in our special brochures, which you can order online or download at: "www.kathrein.de".
Hard copies of these brochures can also be ordered from your nearest Kathrein representative or from our headquarters.



We are always pleased to advise you:

99811484/1/0410/JH/Pf Subject to modification. Technical data represent typical values.

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